DOCUMENT RESUME

ED 271 329 SE 046 864

TITLE	Mathematics, Science, and Computer Science Evaluation Report 1984-85. OEA Evaluation Report. Final Report.
INSTITUTION	New York City Board of Education, Brooklyn. Office of Educational Assessment.
PUB DATE	Mar 86
NOTE	57p.
AVAILABLE FROM	Office of Educational Assessment, New York City Board of Education, 110 Livingston Street, Brooklyn, NY 11201.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	*Computer Science Education; Course Evaluation; Faculty Development; *Inservice Teacher Education; Mathematics Education; Mathematics Teachers; Professional Development; *Program Evaluation; Science Education; Science Teachers; Secondary Education; *Secondary School Mathematics; *Secondary School Science; Staff Development; Summer Programs; Teacher Workshops; Training Methods; Worksheets
IDENTIFIERS	*New York

ABSTRACT

This evaluation report of the Staff Developmnent Program in Science, Mathematics, and Computer Science for 1984-85 contains four chapters. Chapter 1 describes program background and objectives, the scope of the evaluation, and evaluation procedures. These procedures included: (1) memoranda announcing programs; (2) project documents; (3) course schedules; (4) interviews with program directors; (5) trainee reaction forms; (6) follow-up participant questionnaires; (7) curriculum evaluation forms from teachers who piloted science curricula; and (8) observations by Office of Educational Assessment staff on mathematics staff development course sessions and satellite center workshops. Chapter 2 offers an overview of training programs in science, mathematics, and computer science. For the science component, the objectives and orientation of the staff training workshops and in-service courses are explained. For mathematics, the workshops for seventh and eighth grade teachers and supervisors are described as well as the use of training centers. Computer science programs emphasized development of new curricula, computer literacy education, use of technical assistance centers, and review of software programs. Chapter 3 presents data and comments on participants' reactions to the programs and selected aspects of instruction. Chapter 4 contains summaries, evaluations, and recommendations concerning the 1984 science, mathematics and computer science program offerings. (JM)

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OEA Evaluation Report

Mathematics, Science and Computer Science Evaluation Report 1984-85

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FINAL REPORT
MARCH 1986

Mathematics, Science and Computer Science Evaluation Report 1984-85

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ACKNOWLEDGEMENTS

The production of this report is the result of a collaborative effort of full-time staff and consultants. In addition to those whose name appear on the cover, Robert Futterman, Randy Blank, Elly Bulkin, Sandra Ham, Audrey Herr-Kleinfield, David Kritt, Jessica Marta and Theodora Ziongas contributed in different ways to the body of this report. Elias Rosario typed, corrected, and duplicated this report. The Unit would not have handled such a large volume of work and still produce quality evaluation reports without their able participation.

SUMMARY

The Staff Development Program in Science, Mathematics, and Computer Science is administered by the Division of Curriculum and Instruction. It has been in operation since summer, 1982. Its broad aim is to improve the quality of mathematics and science instruction in the city's schools.

During the 1984-85 school year, the program had several objectives. These objectives were:

-To help teachers improve teaching strategies;

-To provide training in the use of new curricula;

-To prepare teachers to provide in-service instruction and other forms of assistance to their peers during the school year;

-To provide ongoing training and support services for teachers, administrators, and other staff.

The evaluation focused on the program's three units: science, mathematics, and computer science. The units shared general objectives. They did, however, operate as separate entities: each had its own administration, training approach, schedule, and particular concerns. The units were generally successful in meeting their program objectives.

The Science Unit's 1984-85 staff development program included a five-day workshop series in summer, 1984 for 470 participants from all levels of the school system. Questionnaire responses indicated general satisfaction with the training workshops and with the new science curriculum introduced to them. Throughout the school year, summer, 1984 participants provided in-service science courses and other informal staff development assistance to their colleagues. Some reported being unaware of this requirement. Nearly 90 percent of those who performed a follow-up activity felt that the summer training had prepared them well to do it.

Participants in the in-service science courses were elementary school or intermediate/junior high school teachers. Responses to the training were very positive. Evaluations from teachers who piloted the new curriculum were very favorable. The Science Unit liaison to the New York Hall of Science began work on additional curriculum and training materials which will make use of the museum's resources.

The Mathematics Unit provided summer workshops of up to three days' duration for nearly 600 intermediate/junior high school and senior high school teachers and supervisors. The training focused on the use of new curricula for students at the seventh- and eighth-grade levels. Participants rated positively the summer training and the curriculum. A small number of these teachers engaged in such follow-up activities as providing training for other teachers and piloting the curricula.

Follow-up mathematics training at satellite centers in each borough began in late May; there were 668 participants. Each participant attended one session. Problems in choosing appropriate sites and coordinating the interests of community school districts and high schools delayed the opening of the satellite centers until May. Participants received training in one or both of the curricula introduced at the summer workshops. Participants rated positively both the training and the curricula.

The Computer and Information Science Unit (C.I.S.U.) concentrated its summer, 1984 workshops on using two new high school-level computer science curricula. Participants in these C.I.S.U. summer, 1984 staff development activities expressed general satisfaction with the training. Most participants were intermediate/junior high school or high school teachers. Over three-quarters of those who piloted the computer science curriculum during the school year found the curriculum guide "very" or "moderately" useful. Those who piloted it were evenly divided as to how well the summer training had prepared them to teach the curriculum. More than 60 percent of respondents considered their level of computer literacy "very" or "moderately" extensive prior to the training and had previously taught computer science or computer literacy.

During the school year, C.I.S.U. continued the wide-ranging computer education program it had begun in 1982-83. It also provided support services for public school personnel at its Technical Assistance Centers (T.A.C.s). In spring, 1985, O.E.A. sent a follow-up questionnaire to a sample of those who had taken C.I.S.U.'s in-service course for credit since the program started in summer, 1982. Respondents indicated that the courses had expanded their knowledge of computers. For a variety of reasons, nearly 60 percent were not using them in their school at all and nearly half never used them for instruction.

Based on the evaluation findings, the following general recommendations are made for the three curriculum areas:

- -Follow-up training for summer staff development workshop participants should be provided throughout the year.

- -Teachers who participated in the summer staff development workshops should be made fully aware of their subsequent responsibility to provide in-service courses, train peers, pilot curriculum, and/or provide feedback.

- -Ongoing contact should be maintained throughout the year with teachers from the summer workshops to establish that they are fulfilling their follow-up responsibilities and to provide them with any needed technical assistance.

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I. INTRODUCTION

PROGRAM BACKGROUND

The Staff Development Program in Science, Mathematics, and Computer Science is administered by the Division of Curriculum and Instruction (C. and I.). It provides staff training and curriculum development support to public school teachers, staff developers, supervisors, and administrators at all grade levels and in all five boroughs. The program's broad aim is to improve the quality of mathematics and science instruction in the city's schools.

The program was first funded by the New York City Council for the 1982-83 school year. In its first year of operation, approximately 250 participants from 30 community school districts and 20 high schools were trained as staff developers; about 550 teachers and supervisors from eight districts and ten high schools received on-site training; and more than 3,600 public school personnel took computer literacy courses at 27 satellite training centers.

In 1983-84, 287 teachers, supervisors, and district office personnel -- as well as 51 high school assistant principals, participated in the centralized training program for staff developers; 214 teachers and supervisors attended mathematics and science training sessions in four designated school districts; and approximately 5,000 public and non-public school personnel* registered for 20 different computer education courses at 44 satellite centers.

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*Courses for nonpublic school personnel were funded by Chapter I and Technical Assistance Center (T.A.C.) monies.

PROGRAM OBJECTIVES

The Staff Development Program in Science, Mathematics, and Computer Science had several programmatic objectives. These objectives were:

- -To help teachers improve teaching strategies;
- -To provide training in the use of new curricula;
- -To prepare teachers to provide in-service instruction and other forms of assistance to their peers during the school year;
- -To provide ongoing training and support services for teachers, administrators, and other staff.

SCOPE OF THE EVALUATION

The evaluation will focus on the program's three units: science, mathematics, and computer science. The units shared general objectives. They did, however, operate as separate entities: each had its own administration, training approach, schedule, and particular concerns.

The Science Unit's 1984-85 staff development program included a five-day workshop series in summer, 1984 for 470 participants from all levels of the school system. Throughout the school year, participants from the summer, 1984 program provided in-service courses and other informal staff development assistance to their colleagues. In addition, the unit began work with the New York Hall of Science, an educational facility operated with city and private funds.

The Mathematics Unit provided summer workshops of up to three days' duration for nearly 600 intermediate/junior high school and senior high school teachers and supervisors. The training focused on the use of new curricula for students at the seventh- and eighth-grade levels. Follow-up training at satellite centers in each borough began in late May; there were 668 participants.

The Computer and Information Science Unit (C.I.S.U.) concentrated at its summer, 1984 workshops on using two new high school-level computer science curricula. During the school year, it continued the wide-ranging computer education program it had begun in 1982-83. It also provided support services for public school personnel at its Technical Assistance Centers (T.A.C.s).

EVALUATION PROCEDURES

The Office of Educational Assessment/Instructional Support Evaluation Unit (O.E.A./I.S.E.U.) used several qualitative and quantitative techniques to evaluate the Science, Mathematics, and Computer Science Staff Development Program. Data sources for all units of the program are described below:

- Memoranda from C. and I. announcing the program and describing its major goals, activities, and selection criteria;
- Project documents: course schedules, eligibility and follow-up requirements, and participant lists;
- Interviews conducted by O.E.A. staff with program directors and with the Science Unit's liaison to the Hall of Science regarding project goals, accomplishments, and problems encountered;
- Reaction forms distributed to trainees at the end of summer, 1984 workshops to obtain initial reactions to the training and recommendations for future staff development activities;
- Follow-up questionnaires distributed to participants in spring, 1985 to obtain assessments of each unit's curriculum and training; recommendations for improvement; and, where applicable, evaluations of in-service instruction or other follow-up activities during the 1984-85 school year;
- Curriculum evaluation forms from teachers who piloted science curricula;
- Observations by O.E.A. staff of a selected number of summer, 1984 mathematics staff development course sessions and satellite center workshops.

SCOPE OF THIS REPORT

The O.E.A./I.S.E.U. report of the 1984-85 Mathematics, Science, and Computer Science Staff Development Program consists of four chapters. Chapter I includes program background, scope of the evaluation, and evaluation procedures. Chapter II offers an overview of the three units of the program. Chapter III presents findings for each of the three unit programs. Chapter IV contains conclusions and recommendations.

III. PROJECT OVERVIEW

SCIENCE

Summer, 1984 Staff Training

Workshops lasting up to five days were conducted for over 470 staff developers, supervisors, and teachers of elementary, intermediate/junior high, and senior high school science programs during August, 1984. District and school administrators selected staff participants. The number and school level depended on the course. Focusing on theoretical as well as practical issues, the training encompassed curriculum topics, instructional approaches, and laboratory activities. Courses for supervisors stressed management techniques.

To extend the benefits of this training to other school personnel, most participants were expected to engage in some follow-up activity during the 1984-85 school year: to teach (with pay) an in-service science course to other teachers in their district; to provide district- or school-based workshops or other informal staff development assistance to their colleagues; and, for those who received training in a new science curriculum, to pilot the curriculum and provide feedback about their experience.

In-Service Science Courses

Most in-service courses had similar general objectives: to promote understanding of the fundamental concepts of the New York City science currricula; to encourage use of the scientific process; and to help teachers develop effective teaching strategies. Typically, these courses involved guiding participants in developing effective questioning techniques, using or devising appropriate instructional materials and

hands-on activities, and designing lessons that encourage critical thinking. Some courses also sought to help trainees integrate science with other curriculum areas.

Staff developers who attended summer, 1984 workshops providing training in the elementary school science curriculum (kindergarten to grade six) or the intermediate/junior high school science curriculum (grades seven and eight) were expected to offer an in-service science course for teachers in their district during the school year. Elementary level courses were offered for one in-service credit (15 training hours) and intermediate/junior high level courses for two credits (30 training hours).

Forty-five participants in the summer, 1984 science staff development courses were approved by the Bureau of Staff Development and Training (B.S.D.T.)* to teach an in-service course during the 1984-85 school year. Eleven courses were given in fall, 1984 and 14 were given in spring, 1985. Eighteen courses had been scheduled for fall, 1984, but seven were cancelled because of low enrollment (fewer than ten); 19 courses had been scheduled for spring, 1985, but B.S.D.T. received enrollment data for only nine of these courses. Five of the nine were cancelled because of insufficient registration.

New York Hall of Science

In February, 1985, the New York City Board of Education hired an education administrator to serve as a liaison between the Science Unit and the New York Hall of Science's education department. Located in Flushing Meadows-Corona Park, the Hall operated on a limited basis

*The B.S.D.T., an office of the Division of Personnel, oversees in-service Training for Board of Education staff.

during 1984-85 because of ongoing renovations; it will re-open in summer, 1986 as an expanded facility. So far, the education administrator's activities have focused primarily on designing instructional materials to aid teachers in preparing students for a visit to the Toronto Science Circus (a traveling exhibit hosted by the Hall of Science in spring, 1985) and on collaborating with the museum's education department to develop model teacher training programs and related materials. When the center is fully operational, the administrator will collaborate with Hall of Science staff to conduct teacher training programs and class tours; prepare and distribute resource and display materials for classroom use; and develop curriculum guides based on Hall exhibits, including pre- and post-trip activities and lesson plans correlated with the New York City science curriculum.

MATHEMATICS

Summer, 1984 Staff Training

Junior and senior high school teachers and supervisors of the new Sequential Mathematics, Course I, Part I attended workshop of up to three days' duration in August, 1984 for teachers and supervisors of seventh- and eighth-grade mathematics curricula. Junior and senior high school district and school administrators were asked to nominate teacher and supervisors of these curricula for training.

Sequential Mathematics, Course I takes a developmental approach to teaching mathematics. Lesson plans consist of specific performance objectives, a section on new vocabulary, motivational activities, applications, and sample homework assignments. They stress the development of problem-solving and reasoning skills necessary in an increas-

ingly technology-oriented society. These lessons, however, are intended only as suggestions. Teachers are expected to exercise judgment in adapting instructional pace and emphasis to meet the specific needs of their students. Summer, 1984 training activities therefore focused on familiarizing participants with the new subject areas and assisting them in using appropriate teaching strategies.

Other training for teachers and supervisors of seventh- and eighth-grade grade mathematics curricula centered on using the Mathematics Scope and Sequence guides. Developed by the Office of Curriculum and Instruction, the guides outline the topic and performance objectives to be mastered by students at these grade levels. Scope and Sequence is part of the continuum of mathematics instruction for grades kindergarten through 12. Mathematics concepts and skills are integrated throughout the development of each topic so that essential relationships, not just isolated facts and operations, are understood. In addition, topics not previously introduced in seventh- and eighth-grade mathematics curricula (for example, probability, statistics, and geometry) are covered. Accordingly, summer, 1984 training in the seventh- and eighth-grade Scope and Sequence guide addressed methodological issues such as writing lesson plans as well as the content of the new curriculum topics.

Summer workshop participants were expected to implement these new curricula and provide feedback to the Mathematics Unit about their experience during the 1984-85 school year. Turnkey assistance to their peers was also expected.

Satellite Center Training

This program component was conceived as a means of providing follow-

up training during the 1984-85 school year for summer, 1984 workshop participants at various sites in each borough. However, a needs assessment survey conducted by the acting director of the Mathematics Unit and feedback from high school mathematics chairpeople indicated a need to extend assistance in understanding and implementing the mathematics curricula to a larger number of school personnel. Problems in choosing appropriate site locations and coordinating the interests of community school districts and high schools delayed the opening of the satellite centers until May, 1985.

Intermediate/junior high school and high school teachers of the seventh- and eighth-grade level curricula Mathematics Scope and Sequence and Sequential Mathematics, Course I and their supervisors were eligible to participate. Superintendents and principals were invited to select two teachers and one supervisor from each intermediate/junior high school and high school to attend. Each course consisted of two two-hour sessions held from 3:30 to 5:30 P.M. Two supervisors -- a high school mathematics chairperson and a mathematics supervisor or coordinator -- were responsible for training at each satellite center.

COMPUTER SCIENCE

Summer, 1984 Staff Training

During summer, 1984, the C.I.S.U. provided staff development in the use of two new computer science curricula: the first volumes of An Introduction to Computer Science I, (Secondary Grades) and Advanced Placement Computer Science with PASCAL. Each course consisted of three three-hour sessions.

The Computer Science I curriculum guide is the first volume of two-volume series intended as a resource for teachers of an advanced course

in computer literacy at the secondary level. It contains performance objectives, a review of important vocabulary, suggested motivational activities, teaching strategies, student assignments, and review questions. Teachers are expected to use the guide in conjunction with other instructional materials to meet diverse student needs. The Advanced Placement Computer Science curriculum is a course in the PASCAL language for high school students taking advanced placement courses in computer science.

Teachers in the Computer Science I courses were expected to pilot the curriculum guide during the 1984-85 school year and provide the C.I.S.U. with feedback by completing the evaluation form in the back of the guide. Attendees at PASCAL workshops were also expected to pilot the curriculum.

Computer Literacy Education

A staff development program in computer education for public school personnel, initiated by the C.I.S.U. in 1982-83, provided a wide range of introductory, intermediate, and advanced courses at the central Board and at borough-wide satellite centers. Topics have included instruction in various computer languages, financial and management applications of computers in school and business settings, review and selection of educational software, and the use of microcomputers as a teaching tool. According to the C.I.S.U., over 12,000 teachers, supervisors, and administrators at all grade levels have participated in these computer education courses.

Technical Assistance Centers

Located in all five boroughs, the T.A.C.s provided support services in computer education to public school personnel. They offered assistance in selecting hardware and software, training in the use of computers for classroom instruction, and offered a wide variety of microcomputer courses. The latest developments in technology were demonstrated at each Technical Assistance Center in order for school personnel to use these concepts to meet their instructional objectives in a variety of curriculum content areas.

Other Computer Science Activities

During the 1984-85 school year, the C.I.S.U. conducted other activities which increase the knowledge about computers and computer instruction of teachers and supervisors. These activities were:

The Software Review. A software review process was maintained and pgraded that provided a basis for the purchase of software for all Board of Education personnel. This process required a vendor to submit software for the approval of pedagogical personnel according to sound educational objectives. Approximately 4,500 pieces of software have been reviewed to date.

The Publication of Computalk Newsletter. Three issues of COMPUTALK were distributed citywide during the 1984-85 school year. COMPUTALK includes information about computer education programs and projects throughout the New York City schools.

The High School MAC/Staff Development. During the spring 1985, nine different schols were identified to receive staff development

training in eight different subject areas. This staff development training enabled these schools to integrate the microcomputer into the subject areas selected by each of the nine schools.

The Citywide District Computer Coordinator's Meetings. Monthly district computer coordinator's meetings were established during the 1984-85 school year. These coordinator's meetings were designed to create an environment for the sharing of ideas and resources and, thereby, promote the more effective use of computers in our schools.

III. FINDINGS

SCIENCE STAFF DEVELOPMENT, SUMMER, 1984

Over 470 teachers, supervisors, and other personnel participated in the summer, 1984 Science Staff Development Program. All trainees received reaction forms at the conclusion of the training sessions. In spring, 1985, a follow-up questionnaire was mailed to the 45 summer, 1984 participants who had offered to teach in-service courses during the 1984-85 school year and to a random sample (33 percent) of all other summer science trainees (N=115). Participants were asked to assess the training received during the summer in light of their teaching or supervisory experience during the 1984-85 school year. They were asked also to describe their involvement in follow-up activities.

Participants' Initial Reactions

Reaction forms distributed at the end of the summer, 1984 training sessions asked participants to rate their training on a scale of 1 to 4, with 1 representing the highest rating and 4 the lowest.* An analysis of the results of the 423 participants who returned reaction forms to the Science Unit in fall 1984 revealed consistently positive responses (Table 1).

Participants' Subsequent Assessment

In spring, 1985, questionnaires were distributed to 160 summer participants. Eighty of these questionnaires were returned. Respondents

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*Throughout this report 1 always represents the highest possible rating and 4 the lowest; where actual scale positions were reversed, the reported ratings have been inverted.

TABLE 1

Participants' Mean Ratings[a] of Science Workshops in Summer, 1984

Factor	Mean Rating[b]
Clarity of objectives	1.6
Interest of course content	1.5
Relevance to training needs	1.7
Usefulness for future work	1.6
Helpfulness of knowledge to work efficiency	1.6
Organization of training	1.6
Quality of instruction	1.5
Instructor's coverage of material	1.8
Applicability of material covered	1.6
Overall assessment	1.6

[a]Mean ratings were computed for 423 participants who completed reaction forms.

[b]A four-point rating scale in which 1=highest rating and 4=lowest rating was used for each item, although the specific scale-point definitions were not identical for each item.

*All aspects of training received very positive ratings.

assessed the unit's curriculum and training; made recommendations for improvement; and, where applicable, evaluated their participation in in-service instruction or other follow-up activities during the 1984-85 school year. Eighty-six percent of respondents were teachers; 10 percent were supervisors; and the remaining 4 percent were other school personnel. Nearly equal numbers were at the intermediate/junior high school and high school levels (39 and 34 percent, respectively); 25 percent were at the elementary school level; and 2 percent were in the category of "other" (for example, district office staff).

Table 2 shows the number of respondents who attended each workshop. (Some attended more than one workshop). The best attended workshops were ninth-grade general science, kindergarten to grade six science curriculum, and intermediate/junior high school science curriculum.

Quality and Usefulness of Training. Spring, 1985 participants who returned the completed questionnaires rated the quality and usefulness of the summer, 1984 training in the context of their school-year experiences. Mean ratings indicated general satisfaction with the program (Table 3).

In more open-ended questionnaire responses, 90 percent of the respondents (N=80) cited aspects of the training they found most useful. Over half mentioned receiving practical information on how to improve teaching as being particularly valuable. A small number mentioned lectures by guest speakers and unrealistic suggestions for implementing curriculum as among the least useful aspects of the training. Forty-four percent of all respondents either did not answer the question regarding least useful aspects of the training or indicated they considered

TABLE 2

Attendance in Science Staff Development Program by Workshop

Workshop	Number	Percent[a]
K-6 science curriculum	22	28%
I.S./J.H.S. science curriculum	18	22
Ninth-grade general science	25	31
Tenth-grade human biology	5	6
Advanced placement biology	6	8
Science research program	7	9
Administration/supervision of High school science program	2	2

[a]Percentages are based on 80 participants who returned follow-up questionnaires. These percentages do not add to 100% because some participants attended more than one workshop.

•The ninth-grade general science curriculum, the K-6 science curriculum, and the intermediate/junior high school science curriculum were the best attended workshops.

TABLE 3

Trainees' Mean Ratings[a] of Various Aspects of Science Training

Factors	Mean Rating[b]	S.D.
Organization of training	1.5	.65
Quality of instruction	1.8	.72
Comprehensiveness of training	2.0	.81
Usefulness of training to supervisory or teaching responsibilities	1.9	.87

[a]Mean ratings were computed for the 80 participants who returned the follow-up questionnaire.

[b]A four-point rating scale in which 1=highest rating and 4=lowest rating was used for each item, although the specific scale-point definitions were not identical for each item.

*The mean ratings for all items were positive with little variability.

no aspects without some utility. Of the 67 who suggested training, a third recommend expanding the program to include activities in more areas, more time, and more materials; and 30 percent suggested providing more specifics on using the curriculum (i.e., concrete applications and teaching techniques).

Curriculum Evaluation. Workshop participants were also asked to evaluate the new science curriculum introduced during the summer training sessions (Table 4). All aspects of the curriculum received a mean rating of "good," indicating general satisfaction. Of the suggestions for improvement made by 57 respondents, the most frequently mentioned were placing greater emphasis on specific lessons and their implementation (30 percent), and adapting the curriculum to student interests and schools with limited funds (16 percent). Some suggestions for adapting the curriculum included adding topics such as ecology, and providing more information on the creative use of inexpensive materials.

Participation in Follow-up Activities. Trainees who participated in workshops that offered training in a particular science curriculum (except Advanced Placement Biology) were required to engage in some follow-up activity during the 1984-85 school year. They could pilot the curriculum and provide feedback, teach an in-service science course, or provide on-site training to their peers.

Fifteen of the 80 respondents to the spring, 1985 questionnaire were enrolled in workshops with no explicit follow-up requirements. Of the 65 who had such a requirement (Table 5), 91 percent said they had engaged in follow-up activities. Non-participants in follow-up activities cited as reasons either low registration for the course they

TABLE 4

Trainees' Mean Ratings[a] of New Science Curricula

Factor	Mean Rating[b]	S.D.
Appropriateness of curriculum for students	1.9	.84
Clarity with which curriculum goals are stated	1.9	.75
Organization of curriculum	2.0	.88
Comprehensiveness of curriculum	2.2	.87
Sequencing of performance objectives	2.1	.81
Usefulness of teaching strategies	2.1	.87
Usefulness of student activities	2.1	.91

[a]Mean ratings were computed for the 80 participants who returned the follow-up questionnaire.

[b]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

*Overall, participants rated new science curricula positively.

TABLE 5

Summer Science Trainees' Participation in Follow-up Activities during the 1984-85 School Year

Follow-up Activity	Number	Percent
Piloted new curriculum	18	22%
Taught in-service course	14	18
Provided informal training to others	22	28
Other	7	9
Did not participate in follow-up:		
*Follow-up expected	13	16
*No follow-up expected	8	10

[a]Percentages are based on 80 participants who returned follow-up questionnaires. The total is greater than 100% because several people participated in more than one activity.

*Most trainees who expected to participate in follow-up activities during the school year did so; most frequently this follow-up activity consisted of providing training to others.

offered to teach or their own lack of awareness of the follow-up requirement.

Seventy-six percent of the 80 respondents, including six individuals who had not taken the workshops with specifically stated follow-up requirements, participated in some form of follow-up activity. Over half of these (59 percent) provided training to others -- either by teaching an in-service course (23 percent) or providing informal assistance (for example, answering questions from new teachers about the curriculum), introducing the curriculum at departmental conferences, or conducting seminars on its use (36 percent). Fewer participants (30 percent) reported piloting the new curriculum. Several (11 percent) participated in other activities: for example, working with district committees to develop science curricula.

The 36 summer trainees who provided training to others during the school year were asked to describe its nature and extent. Nearly all of the 30 respondents said they reviewed specific curricular topics. A few noted that they also dealt with general teaching strategies, questioning techniques, and ways of motivating students.

This training was provided at the respondent's own school or district office. From one to ten people were trained by 59 percent of the respondents; 41 percent assisted larger groups. Altogether, 45 percent of the spring, 1985 respondents provided some kind of training to about 400 of their peers during the 1984-85 school year.

Note: It should be pointed out that deliberate efforts were made to train the participants to train others. This was done, in part, because of recommendation made in the 1983-84 evaluation of this program.

Of the 36 participants who responded to a question aksing them to rate how well the summer training prepared them to train others, 86 percent said "very" or "moderately" well. Less than 15 percent thought themselves inadequately prepared. Specific recommendations by nine respondents for improving the preparation received during the summer to enhance ther ability to train others included more practical, detailed information on teaching techniques and more workshops in additional areas.

Finally, those who piloted a new science curriculum during the 1984-85 school year were asked to describe and evaluate this experience. Nearly two-thirds of the 32 people responding to this question taught many lessons from the guide and supplemented them with other materials. Slightly more than 15 percent taught the entire course using the curriculum guide alone; an equal proportion used the guide as intended -- as an instructional tool to be adapted as needed. Respondents' assessment of the curriculum guide was positive overall: most considered it "moderately" or "very" useful in teaching the new curriculum (47 and 44 percent, respectively). A few rated it "minimally" useful. Nearly three-quarters of those who piloted a new science curriculum encountered problems. The most frequently mentioned problems were the unavailability of such necessary materials as texts, the teacher's guide, and laboratory and audiovisual equipment, and the difficulty for some students of the curriculum.

IN-SERVICE SCIENCE COURSES, 1984-85

In spring, 1985, questionnaires were mailed to 163 individuals known to have taken 1984-85 in-service science courses taught by summer, 1984

science staff development workshop participants. As of mid-April, however, enrollment figures were incomplete because all course instructors had not submitted to the B.S.D.T. requested registration information. B.S.D.T. personnel cited the difficulty of obtaining complete information as a problem in administering these training activities, particulary in awarding credit to those who successfully completed courses. This difficulty also meant that the sample to whom questionnaires were mailed, which included 115 fall, 1984 and 48 spring, 1985 trainees, was not selected from the total number of in-service science course participants.

Approximately two-thirds of the 62 participants who returned questionnaires were elementary school level staff and about one-third were at the intermediate/junior high school level. The majority (94 percent) were teachers. Equal numbers took one- and two-credit courses (comprising 15 and 30 hours of training, respectively). A majority (90 percent) of respondents completed the course. Of those who did not, only two failed to do so because the course fell short of their expectations.

Participants' Assessment

Participants were asked to rate the extent to which course objectives were met. Since not all stated objectives were necessarily appropriate for all courses, a "does not apply" option was included. Respondents reported that the objectives of the courses they took were generally well met (Table 6). Over two-thirds rated the training extremely successful in promoting an understanding of New York City science curriculum process skills and concepts, in helping teachers to use hands-on techniques effectively, and in locating and devising appropriate instructional materials. Forty-seven percent perceived the

TABLE 6

Percentages[a] of Participants' Ratings of How Well In-Service Science Course Objectives Were Met

Objective	Ratings				
	Very Well	Fairly Well	Poorly	Not at All	Does not Apply
To promote understanding of New York City science curriculum concepts	71%	18%	2%	0%	10%
To promote understanding and/or use of science process skills	74	21	2	0	3
To develop effective questioning techniques	46	44	3	3	4
To locate and/or devise appropriate instructional materials	69	27	0	2	2
To use laboratory and/or other hands-on techniques effectively	73	18	5	2	3
To integrate science with other curriculum areas	40	40	3	7	10

[a]Percentages were computed for the 62 respondents to the questionnaire. These percentages may not total 100% due to rounding.

*Four out of six objectives of in-service courses were judged to have been very well met by about 70% of the trainees; the remaining two were seen as being achieved somewhat less successfully.

training sessions as less successful in assisting in the development of effective questioning techniques; 43 percent felt similarly about strategies for integrating science with other curricular areas.

Nearly three-fourths of respondents to a follow-up question rated the in-service course content "very appropriate" to their needs, while 21 percent rated it "moderately appropriate." The training was judged "very well organized" by 87 percent and "very comprehensive" by 72 percent. Approximately two-thirds of the respondents considered the in-service training "very useful" in helping them to implement the New York City science curriculum; 21 percent rated it "moderately useful" for this purpose.

Participants were asked also to rate several specific aspects of the in-service course they attended (Table 7). Five of the seven aspects related to quality of instruction were rated "excellent" by over 70 percent of respondents; all seven aspects were rated either "excellent" or "good" by 88 percent of responding participants.

Respondents were asked also to describe the most useful part of the training. Exposure to new techniques and materials was the response most often given (41 percent) by the 57 who responded. This response was followed by the chance to engage in hands-on experiences (29 percent). Opportunities to become familiar with the new science curriculum and networking with colleagues were also considered very useful.

Fewer respondents (38) identified certain areas of the training as weak. Eight of these centered their criticism on the fact that workshops included participants from too many different grade levels and with different curricular concerns. As a result, these participants

TABLE 7

Percentages[a] of Participants' Ratings of In-Service Science Courses

Factor	Ratings			
	Excellent	Good	Fair	Poor
Instructor's knowledge of New York City science curriculum	85%	13%	2%	0%
Instructors' questioning techniques	58	32	8	2
Presentation of subject matter	76	23	2	0
Quality of instructional materials	73	24	2	2
Opportunities for hands-on experiences	69	19	8	3
Level of preparation	79	16	5	0
Instructors' encouragement of class participation	81	16	3	0

[a]Percentages were computed for the 62 respondents to the questionnaire. These percentages may not total 100% due to rounding.

*All aspects of in-service training were rated positively by a large majority of trainees.

deemed the course content of some sessions insufficiently relevant to their specific needs. Participation of teachers with varying degrees of experience in the same workshops was perceived as an additional problem because many new teachers lacked the experience and confidence to contribute to class discussions. A considerable number of respondents (18) specifically stated that no aspect of the training was entirely without value.

NEW SCIENCE CURRICULA

Teachers who piloted a new science curriculum during 1984-85 -- Ninth-Grade General Science or Tenth-Grade Human Biology -- were expected to complete forms rating the curriculum and to make suggestions for revising it. The Science Unit sent a follow-up reminder to principals of teachers who taught these curriculua, but fewer than 30 forms in each subject area were returned. While this sample is not representative of all curriculum users, the responses may prove useful in identifying some general trends.

Ninth-Grade General Science. The Science Unit received 26 Ninth-Grade General Science curriculum evaluations forms. Reactions to this new curriculum were mostly positive: 5 percent of respondents viewed the goals as clearly stated and the format useful; 79 percent termed the course of study well organized; and 76 percent concluded that suggested activities would enable students to achieve the performance objectives (Table 8).

The level of difficulty of the ninth-grade curriculum was cited as its major weakness, particularly for below-average students, but also for those of average ability. Two-thirds of the respondents pointed to time constraints posed by the necessity of scheduling a double period

TABLE 8

Users' Assessments of the New Science Curricula

Question	General Science				Human Biology			
	Yes		No		Yes		No	
	N	%	N	%	N	%	N	%
Are the goals of this course of study clear?	22	85%	4	15%	29	100%	0	0%
Does this curriculum meet your students' needs?	19	76	6	24	24	83	5	17
Is the format of this course of study useful?	22	85	4	15	28	97	1	3
Is this course of study well organized?	19	79	5	21	23	85	4	15
Would you make any changes in the types of learning activities presented in this course of study?	18	72	7	28	12	50	12	50
Did the suggested activities enable the students to achieve the performance objectives?	19	76	6	24	22	88	3	12
Did any of the suggested laboratory activities cause problems?	15	65	8	35	5	22	18	78
Do you think there will be any difficulties in implementing this course?	18	69	8	31	5	20	20	80

*A majority of users of the ninth-grade general science curriculum rated most aspects of the curriculum favorably, although they experienced difficulties with some laboratory and other learning activities. Most anticipated difficulties in implementing it.

*A majority of users of the tenth-grade human biology curriculum rated all aspects of the curriculum favorably and did not experience problems with the laboratory activities. They did not anticipate difficulties implementing it.

for laboratory activities and inadequate laboratory facilities as major difficulties in implementing the curriculum.

Tenth-Grade Human Biology. A total of 29 forms evaluating the Tenth-Grade Human Biology curriculum were returned. Reactions to it were positive (Table 8). All respondents saw the goals as clearly stated. Most considered the course useful (97 percent); responsive to student needs (83 percent); and well organized (85 percent). Relatively few difficulties were reported in implementing the Tenth-Grade Human Biology curriculum.

HALL OF SCIENCE

The Hall of Science was open for several weeks in the spring of 1985 to host the Toronto Science Circus, a traveling exhibition from the Ontario Science Center. The Science Circus featured learning by doing: for example, converting muscle energy into mechanical, electrical, and light energy by pedaling a bicycle or making music and other sounds with an electronic synthesizer. Over 20,000 teachers and students were among the 70,000 visitors to the exhibit.

Consistent with their outreach philosophy, Hall of Science staff conducted (at a cost of $75) a traveling Starlab program for member schools of Cultural Institution Network, a group of cultural organizations that provide enrichment activities for gifted and talented students. They visited 15 schools in eight community school districts in spring, 1985. Consisting of three one-hour visits, the program featured a show entitled "Constellations Tonight" and a pre- and post-visit emphasizing such hands-on activities as making and using star finders, reading star maps, and creating constellations.

MATHEMATICS STAFF DEVELOPMENT, SUMMER, 1984

Nearly 600 public school personnel attended mathematics workshops during summer, 1984. Their assessment of these activities was requested at the end of the summer sessions and again in spring, 1985. The first questionnaires sought initial reactions to the training, suggestions for improvement, and recommendations for subsequent staff development. Follow-up questionnaires, mailed to a random sample (147) of summer trainees, centered on the quality and value of this training in light of their experience with the new mathematics curriculum during the 1984-85 school year, assessment of the curriculum itself, and information about involvement in other follow-up activities.

Participants' Initial Reactions

Participants received reaction forms at the end of the summer, 1984 workshops which asked them to rate various aspects of the training. Of the 508 participants who completed these forms, 426 were teachers, 52 school administrators, and the remainder other school personnel. Findings indicated favorable reactions to this staff development activity (Table 9).

Suggestions for improving summer training sessions included: focusing on entire topics instead of individual lessons and allowing more time for in-depth coverage of topics. Requests are made for such additional materials as instructional resources, student worksheets, and copies of Regents exam and Scholastic Aptitude Test (S.A.T.) practice items. Classroom management, motivational techniques, and implementation strategies were among the recommended follow-up topics.

TABLE 9

Participants' Mean Ratings[a] of Mathematics Workshops in Summer, 1984

Factor	Mean Rating[b]
Clarity of objectives	1.5
Interest of course content	1.7
Relevance to training needs	1.6
Usefulness for future work	1.7
Helpfulness of knowledge to work efficiency	1.6
Organization of training	1.6
Quality of instruction	1.5
Instructor's coverage of material	1.5
Applicability of material covered	1.6
Overall assessment	1.7

[a]Mean ratings were computed for the 508 participants who completed reaction forms.

[b]A four-point scale in which 1=highest rating and 4=lowest rating was used for each item, although the specific scale-point definitions were not identical for each item.

*All aspects of training received positive ratings.

Participants' Subsequent Assessment

Fifty-seven of the 147 follow-up questionnaires mailed to participants in spring, 1985 were completed and returned. Sixty-seven percent of respondents were intermediate/junior high school staff; 23 percent were high school personnel; and the rest had elementary level or other assignments. Seventy-five percent were teachers; 19 percent were supervisors; and the remainder had other positions (for example, staff developer). Two-thirds attended workshops on the Sequential Mathematics, Course I, Part I, and one-third attended sessions devoted to the Mathematics Scope and Sequence for grades seven and eight.

Quality and Usefulness of Training. Respondents from both workshops rated all aspects positively, although the variability of ratings was greater among Scope and Sequence trainees (Table 10).

In addition, a large majority (86 percent) of respondents pinpointed aspects of the training they considered useful. These respondents (N=49) most frequently cited the following as useful: teaching methods presented (39 percent); coverage of substantive topics (31 percent); and materials distributed (36 percent). A smaller number (67 percent) singled out items they considered the least useful aspects of the training (N=38). Most frequently mentioned was the failure to introduce new content and teaching methods (45 percent). Suggestions made by 61 percent of respondents (N=35) for improving summer training included: concentrating on math content (29 percent); introducing new strategies for implementing the curriculum, particularly in areas students find difficult (23 percent); revising selection criteria for instructors (20 percent); and allotting more time for each topic (17 percent).

TABLE 10

Summer Trainees' Mean Ratings[a] of Mathematics Training in Spring, 1985

Aspect	Scope and Sequence[b] Mean Rating	Scope and Sequence[b] S.D.	Sequential Mathematics[b] Mean Rating	Sequential Mathematics[b] S.D.
Organization of training	2.1	.92	1.4	.50
Quality of instruction	2.2	1.00	1.9	.62
Comprehensiveness of training	2.3	.97	2.1	.62
Anticipated usefulness of training	2.3	1.02	1.9	.74

[a]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

[b]Mean ratings were computed for the 57 participants who returned the follow-up questionnaires.

*All aspects of training were rated positively by trainees attending both Scope and Sequence and Sequential Mathematics workshops, although there was greater variability in the ratings of the Scope and Sequence trainees.

Evaluation of Curriculum. Respondents also rated aspects of the mathematics curriculum in which they received training during summer, 1984. Overall, respondents trained in Scope and Sequence and those trained in Sequential Mathematics rated these curricula positively, although there was greater variability in the ratings of Scope and Sequence trainees (Table 11).

Two-thirds of the respondents recommended specific changes in the curriculum in which they had received training. The majority of these suggestions focused on the related issues of pacing, allotting time for review, and reducing the amount of information covered in particular lessons; nearly one-quarter centered on changing the sequencing of materials.

Follow-up Activities. Fifteen of the 57 respondents supervised others in the use of a new mathematics curriculum during the 1984-85 school year. Fourteen reported schools as the site of training; one listed the district office. Topics covered included an overview of the curriculum, specific topic areas, and problem solving.

A large majority (86 percent) of those who provided such assistance said the training received during the summer prepared them "very" or "moderately" well to fulfill this responsibility. However, they also noted that more sessions and follow-up training or networking during the school year would have been useful. They found that teachers generally needed the most assistance with probability and statistics, logic, and problem solving.

Of the 37 summer workshop participants who reported teaching new mathematics curriculum during the 1984-85 school year, the majority said

TABLE 11

Summer Trainees' Mean Ratings[a] of Mathematics Curricula in Spring, 1985

Aspect	Scope and Sequence		Sequential Mathematics	
	Mean Rating	S.D.	Mean Rating	S.D.
Appropriateness of the curriculum for students	1.8	.87	1.9	.81
Calrity with which curriculum goals are stated	2.0	1.0	1.9	.66
Organization of curriculum	2.5	.96	1.8	.92
Comprehensiveness of curriculum	2.2	1.16	1.8	.71
Sequencing of performance objectives	2.2	1.06	1.9	.88
Usefulness of teaching strategies	c		2.1	.99
Usefulness of student activities	c		2.3	.87

[a]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

[b]Mean ratings were computed for the 57 respondents to the follow-up questionnaire.

[c]The Scope and Sequence curriculum guide did not include teaching strategies or student activities.

*Both Scope and Sequence and Sequential Mathematics trainees rated all aspects of these curricula positively, although there was greater variability in the ratings of Scope and Sequence trainees.

they taught many lessons from the curriculum guide, but supplemented these with other instructional materials. About 10 percent taught the course using the guide exclusively; slightly more than 20 percent used it occasionally, and 5 percent did not use it at all. A large majority (86 percent) of those who used the guide in any way considered it "very" or "moderately" useful. Difficulties encountered by those who piloted a new curriculum related primarily to the pacing of instruction and level of difficulty. Only 13 resondents said they had párticipated in an evaluation of the curricular materials they piloted.

SATELLITE CENTERS

A total of 668 intermediate/junior high and high school teachers and supervisors attended mathematics training sessions in May, 1985 at sites in all five boroughs. Each participant attended one session. Questionnaire were mailed in early June to a random sample of teachers (174) and to all participating supervisors (30). Questionnaires from 96 teachers and 24 supervisors were returned. Nearly equal proportions attended workshops on Scope and Sequence and Sequential Mathematics; 11 percent received training on both.

Quality and Usefulness of Training. Respondents rated various aspects of satellite center training (Table 12). All aspects of training in both curricula received generally positive ratings.

A large majority (83 percent) of both groups of respondents to an open-ended follow-up questionnaire (N=100) identified the most useful aspects of their training. The most commonly mentioned were the reviewing of curriculum goals and curriculum guides (44 percent); course materials (19 percent); teaching strategies (17 percent); and opportunities

TABLE 12

Satellite Center Trainees' Mean Ratings[a] of Training

Aspect	Scope and Sequence		Sequential Mathematics	
	Mean Rating[b]	S.D.	Mean Rating[b]	S.D.
Organization of training	1.7	.54	1.8	.91
Quality of instruction	1.8	.86	2.1	.71
Comprehensiveness of training	1.9	.69	2.2	.97
Adequacy of number of sessions to training needs	2.1	.95	2.3	.96
Anticipated usefulness of training	2.0	.82	2.1	.89

[a]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

[b]Mean ratings were computed for the 120 participants who returned questionnaires.

*All aspects of training were rated positively by trainees attending both Scope and Sequence and Sequential Mathematics workshops.

to exchange ideas with peers and supervisors (11 percent). About 62 percent of respondents (N=75) mentioned what they saw as the least useful aspects of the training. These included repetition of material (29 percent); faulty sequencing of instructional materials (13 percent); and inappropriate focus of instruction (11 percent). About 15 percent of all respondents found no aspects of the training without some usefulness.

Seventy percent of all respondents (N=91) (suggested ways of improving the training. Most frequently mentioned were more instructional time (32 percent); more varied teaching strategies (22 percent); and better overview of the curriculum and/or ways of integrating it with traditional topics (13 percent).

Curriculum Evaluation. Respondents also evaluated the curriculum introduced at the satellite center workshop. Table 13 shows trainees' rating of the Sequential Mathematics and Scope and Sequence curricula. Both were generally considered "good." Nearly one-half of all respondents (N=56) recommended curricular changes. These included making sequencing more logical (34 percent); including more teaching strategies (21 percent); and adapting the curriculum for slower learners (18 percent).

Observer's Evaluation

An O.E.A. staff member observed two satellite center workshop sessions -- one for teachers of Scope and Sequence and one for Junior High School supervisors of Sequential Mathematics. In both instances, the instructor's knowledge and presentation of the subject matter, relevance of the topics covered, and trainees' level of interest were judged favorably.

TABLE 13

Satellite Center Trainees' Mean Ratings[a] of Mathematics Curricula

Aspect	Scope and Sequence		Sequential Mathematics	
	Mean Rating[b]	S.D.	Mean Rating[b]	S.D.
Appropriateness of the curriculum for students	2.1	.87	2.2	.79
Clarity with which curriculum goals are stated	2.1	.75	2.2	.71
Organization of curriculum	2.3	.89	2.4	.85
Comprehensiveness of curriculum	2.1	.79	2.3	.82
Sequencing of performance objectives	2.5	.91	2.5	.83
Usefulness of teaching strategies	c		2.2	.86
Usefulness of student activities	c		2.4	.83

[a]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

[b]Mean ratings were computed for the 120 participants who returned questionnaires.

[c]The Scope and Sequence curriculum guide did not include teaching strategies or student activities.

*Both Scope and Sequence and Sequential Mathematics trainees rated all aspects of these curricula positively.

The instructor of the course for supervisors tended to lecture. The observer noted that despite periodic requests for participation, there were few questions and there was little discussion. The observer attributed the low level of involvement to the fact that because these trainees were not primarily math teachers, they may have needed to become more familiar with new material. The session was geared to the supervisory responsibilities of the participants. The instructor suggested that supervisors themselves teach the subject at least once. A list of alternative ways of organizing the material for student who might find the pilot edition too difficult was also provided. The instructor invited participants to call to discuss any difficulties encountered in implementing the curriculum.

The instructor of the course for teachers actively sought to involve participants and made good use of a variety of instructional materials. However, the observer thought the pacing too fast, and attributed this to the instructor's misunderstanding of the allotted time for the session.

COMPUTER SCIENCE STAFF DEVELOPMENT, SUMMER,1984

Summer, 1984 staff development activities sponsored by the C.I.S.U. focused on training in the use of two new computer science curricula for secondary students; an introductory course (Computer Science I), and an advanced placement course in PASCAL.

Participants' Initial Reactions

Reaction forms were distributed in August, 1984 to 86 participants

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*Since the anticipated number of users of the PASCAL curriculum was relatively small, C.I.S.U. recommended that O.E.A.'s evaluation focus on training in Computer Science I.

in three Computer Science I course sessions and to 30 in one PASCAL session. Generally, both groups of trainees were satisfied with the training, although the overall rating by PASCAL workshop attendees was higher than that of Computer Science I trainees. Major participant recommendations included extending the number and length of the summer sessions to permit more extensive coverage of the materials and offering follow-up sessions during the school year.

Participants' Subsequent Assessment

In spring, 1985, a follow-up questionnaire was mailed to all 128 participants in the summer, 1984 Computer Science I courses requesting information about the usefulness of the summer, 1984 training in preparing them to pilot the new curriculum and their use of the curriculum guide during the 1984-85 school year. Nearly 50 percent of those to whom questionnaires were mailed completed and returned them (N=63); most of these were classroom teachers of computer science (56 percent) of mathematics (47 percent); 22 percent were administrative and district office personnel. Approximately 60 percent of respondents were intermediate/junior high school level staff; 40 percent worked at the high school level.

Forty-five percent of respondents taught the Computer Science I curriculum during the 1984-85 school year. One-half of the 23 respondents who gave reasons for not teaching the course said they had not been assigned to do so. Other reasons given included: failure to receive the guide: inappropriateness of the curricuum for their students; and the absence of computers in their schools.

A majority (79 percent) of those who used the Computer Science I

curriculum guide for classroom instruction considered it "moderately" or "very" useful. Although about one-half of these reported only occasional use, 40 percent said they taught many lessons from it and used other materials as supplements. The guide is intended only as one source of instructional support. No one used it exclusively to teach the course. Respondents' assessments of the Computer Science I curriculum guide (Table 14) were generally positive. Appropriateness of curriculum was the area of greatest opinion variability.

The 28 participants who piloted the 1984-85 Computer Science I curriculum were evenly divided in their judgment of how well the summer, 1984 training had prepared them to teach the curriculum: one-half said "very" or "fairly" well; the other half said "poorly" or "not at all." More than 60 percent of all respondents not only considered their level of computer literacy "very" or "moderately" comprehensive prior to their participation in the staff development workshops, but had previously taught computer science or computer literacy to intermediate or high school students. The most frequently mentioned problem was adapting the new curriculum to different levels of student ability. Close to 40 percent of the respondents who taught the course said they could have used additional assistance during the summer. Few said they needed additional assistance during the school year. Participants' requests centered on opportunities to share ideas with other teachers using the curriculum and on improved computer maintenance and repair.

Participants in the summer, 1984 Computer Science I training program were expected both to pilot the new curriculum during the school year and to provide the C.I.S.U. with feedback about the instructional guide.

TABLE 14

Participants' Mean Ratings[a] of Computer Science I Curriculum Guide

Dimension	Mean Rating[b]	S.D.
Appropriateness of the curriculum for students	2.5	1.17
Clarity with which curriculum goals are stated	2.1	.82
Organization of curriculum	2.1	.84
Comprehensiveness of curriculum	2.2	.89
Sequencing of performance objectives	2.3	.85
Usefulness of teaching strategies	2.3	.88
Usefulness of student activities	2.3	.91

[a]Rating scale: 1=Excellent; 2=Good; 3=Fair; 4=Poor

[b]Mean ratings were computed based on 63 participants who returned questionnaires.

*All aspects of the curriculum guide were rated positively, although there was greater variability of opinion regarding the appropriateness of the curriculum than for any other factor.

However, since the unit received fewer than ten completed feedback forms, these were not analyzed. While the total number of teachers who piloted Computer Science I during 1984-85 is unavailable, most of the respondents to the follow-up questionnaire who did teach the course reported being unaware of the requirement that they participate in an evaluation of the curriculum guide.

COMPUTER LITERACY EDUCATON

In spring, 1985, a follow-up questionnaire was mailed to a four-percent random sample (112) of New York City public school personnel identified by the C.I.S.U. as having taken a microcomputer course for in-service credit at some point since the start of the program in summer, 1982. In view of a response rate of less than 25 percent, caution must be exercised in drawing conclusions from these findings, although some overall trends can be identified. Over one-half of the respondents were elementary school teachers; the remainder were intermediate or junior high school teachers and people with administrative or supervisory positions. The number of courses taken ranged from one to six, with most having taken one or two.

Participants' Assessment

Participants were asked to rate the extent to which the computer literacy courses assisted them in understanding and using or supervising the educational use of computers (Table 15). Nearly all indicated that their participation in the courses had expanded their knowledge of microcomputers. However, slightly less than one-half said the training had helped "moderately" or "very much" in using the computer as an

TABLE 15

Percentages[a] of Participants' Ratings of Usefulness of Computer Literacy Training

Factor	Helped Very Much	Helped Moderately	Helped Minimally	Helped Not at all	N.A.
Knowledge of computers	46%	39%	15%	0%	0%
Supervisory practices regarding microcomputers	8	17	8	25	42
Using computers as a teaching tool	31	15	23	19	12
Teaching computer literacy concepts	15	31	23	12	19

[a]Percentages were computed for 27 participants who returned the follow-up questionnaire.

•Nearly all computer literacy trainees felt that the training they received contributed to their understanding of computers, but less than half felt that it helped them to use computers as an educational tool or to teach computer literacy concepts.

instructional tool or in teaching computer literacy. The need for assistance in using computers for supervision did not apply to 42 percent of these respondents, probably because this sample was largely comprised of teachers. Their responsibilities were likely to be instructional rather than supervisory.

According to these respondents (N=27), the chief strengths of the computer literacy courses were exposure to computer terminology and software (41 percent); hands-on experience (37 percent); and patient and competent instructors (22 percent). The major weaknesses were thought to be insufficient access to computers (44 percent) and fast pacing of instruction (44 percent).

Use of computers in the schools varied. Although two-thirds of all respondents assessed the computer literacy courses they took positively, nearly 60 percent said they did not use microcomputers in their school at all; none were available in three instances. Asked how often they used computers for intruction, 48 percent of the respondents (N=13) said "never." Of the eight who indicated that they did use them for this purpose, six said they did so once a week or more. Interestingly, although a significant proportion of these respondents did not use microcomputers with their students, of the 15 who expressed an opinion about the value of this technology as a teaching aid, 12 felt that microcomputers facilitated learning. Since more indivuals answered this question than reported using microcomputesr, these responses are probably based more on teachers' expectations of the educational benefits of computers than on actual experience utilizing them.

V. CONCLUSIONS AND RECOMMENDATIONS

The Staff Development Program in Science, Mathematics, and Computer Science was generally successful in meeting its programmatic objectives. These objectives were:

- -To help teachers improve teaching strategies;
- -To provide training in the use of new curricula;
- -To prepare teachers to provide in-service instruction and other forms of assistance to their peers during the school year;
- -To provide ongoing training and support services for teachers, administrators, and other staff.

Over 470 teachers, supervisors, and other personnel from all levels of the school system participated in the summer, 1984 five-day Science Staff Development Program. Questionnaire responses indicated general satisfaction with the training workshops and with the new science curriculum introduced to them. Over 90 percent of a sample of participants in workshops with follow-up requirements reported engaging in such follow-up activities as teaching an in-service course or providing informal curriculum assistance to colleagues. Some reported being unaware of this requirement. Nearly 90 percent of those who performed a follow-up activity felt that the summer training had prepared them well to do it.

Participants in the in-service science courses were teachers from elementary schools or intermediate/junior high schools. Responses to the training were very positive. Evaluations from teachers who piloted the new curriculum were vary favorable; however, these responses came from a small number of teachers. The Science Unit liaison to the New

York Hall of Science began work on curriculum and training materials which will make use of the museum's resources.

The Mathematics Unit provided summer workshops of up to three days' duration for nearly 600 intermediate/junior high school and senior high school teachers and supervisors. The training focused on the use of new curricula for students at the seventh- and eighth-grade levels. Participants rated positively the summer training and the curriculum. A small number of these teachers engaged in such follow-up activities as providing training for other teachers and piloting the curricula.

In May, 1985, 668 intermediate/junior high school and high school teachers and supervisors attended after-school mathematics trainings sessions at satellite centers in each borough. Each participant attended two sessions. Problems in choosing appropriate sites and coordinating the interests of community school districts and high schools delayed the opening of the satellite centers until May. Participants received training in one or both of the curricula introduced at the summer workshops. Participants rated positively both the training and the curricula.

Participants in the Computers and Information Science Unit's summer, 1984 staff development activities on two new computer science curricula expressed general satisfaction with the training. Most participants were intermediate/junior high school or high school teachers. Over three-quarters of those who piloted the computer science curriculum during the school year found the curriculum guide "very" or "moderately" useful. Those who piloted it were evenly divided as to how well the summer training had prepared them to teach the curriculum. More than 60

percent of respondents considered their level of computer literacy "very" or "moderately" extensive prior to the training and had previously taught computer science or computer literacy.

Based on the evaluation findings, the following recommendations are made:

- -Follow-up training for summer staf development workshop participants should be provided throughout the year.
- -Teachers who participated in the summer staff development workshop should be made fully aware of their subsequent responsibility to provide in-service courses, train peers, pilot curriculum, and/or provide feedback.
- -Ongoing contact should be maintained throughout the year with teachers from the summer workshops to establish that they are fulfilling their follow-up responsibilities and to provide them with any needed technical assistance.